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The invention relates to a biochemical assay for wide class of hydrophobic Coenzyme A esters wherein the analyte is caused to react with a specifically binding, modified protein, and thereby causing a detectable signal. A one step assay for hydrophobic carboxylic acid esters in whole blood, serum, food and feed preparations, tissue extracts, acyl-CoA synthetase reaction media and various laboratory conditions using a modified Coenzyme A- and acyl-CoA binding protein (ACBP) is provided. Furthermore the invention relates to a construct comprising a peptide and a signal moiety for performing an assay, a kit for assaying hydrophobic CoA esters, hydrophobic carboxylic acids, triacylglycerides, phospholipids, and cholesterol esters.